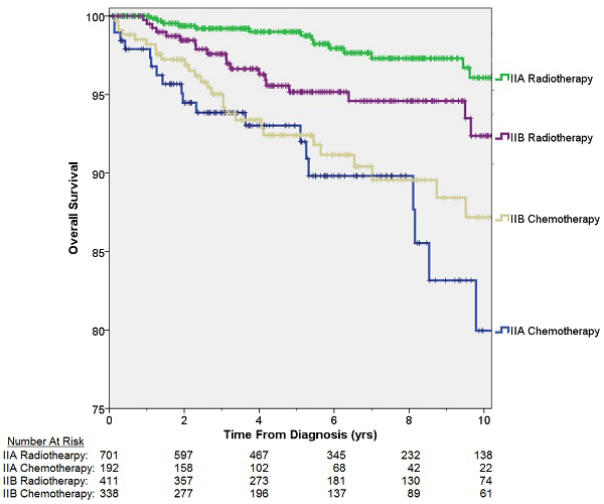
Material and Methods: Using the National Cancer Data Base, we identified stage II seminoma patients treated with orchiectomy and either RT or MACT diagnosed from 1998-2012. Separately for stage IIA and IIB, factors affecting treatment modality (RT vs. MACT) were studied using a parsimonious multivariable logistic regression model. Propensity scores for treatment decision were incorporated into a multivariable Cox regression analysis of overall survival.

Results: Analysis included 2,437 patients (IIA=960, IIB=812, IIC=665). Median follow-up was 65 months (IQ range 34-106). Rates of RT utilization by stage were: IIA=78.1%, IIB=54.4%, IIC=4.2%. Rates of MACT utilization by stage were: IIA=21.9%, IIB=45.6%, IIC=95.8%. Median RT dose was: IIA=30.9 Gy (IQR 25.5-35.5) and IIB=35.5 Gy (IQR 31.1-36.0). For both IIA and IIB patients, later year of diagnosis, treatment at an academic facility, and pathologic assessment of lymph node(s) were associated with increased use of MACT vs. RT. Also predictive for preferential use of MACT were Charlson-Deyo comorbidity score of 1+ and non-private insurance for IIA patients, and T stage of 2+ for IIB patients. Unadjusted 5-year survival by stage was: IIA=97.1% (95% confidence interval [CI] 96.1-98.1), IIB=93.9% (95% CI 92.1-95.7), IIC=92.6% (95% CI 90.6-94.6), log-rank p=0.006. Factors predicative of improved survival on multivariable analysis included age<40, private insurance, and comorbidity score of zero. For IIA patients, overall survival was improved with RT compared to MACT with a 5-year survival of 99.0% (95% CI 98.2-99.8) vs. 93.0% (95% CI 89.0-97.0). This advantage persisted on multivariable analysis with a HR of 0.22 (95% CI 0.08-0.64, p=0.005) and propensity adjusted HR of 0.28 (95% CI 0.09-0.86, p=0.027). For IIB patients, 5-year survival was 95.2% (95% CI 92.8-97.6) for RT and 92.4% (95% CI 89.2-95.6) for MACT (log-rank p= 0.041). This was not statistically significant on multivariable analysis with a HR of 0.74 (95% CI 0.32-1.70, p=0.475) and propensity adjusted HR of 0.77 (95% CI 0.33-1.80, p=0.549). An unadjusted Kaplan-Meier plot by stage and treatment is given in Figure 1.



Conclusion: In the largest cohort of stage II seminoma patients evaluated to date, we have identified numerous factors predictive for treatment selection and overall survival. We have shown a survival advantage for stage IIA patients treated with RT compared with MACT, while no such survival advantage was seen for stage IIB patients.

OC-0540

IOERT after gross total resection combined with EBRT in extremity sarcoma: a pooled analysis

F. Roeder[1,2], A. De Paoli[3], I. Alldinger[4], G. Bertola[3], G. Boz[3], J. Garcia-Sabrido[5], M. Uhl[6], A. Alvarez[7], B. Lehner[8], F. Calvo[7], R. Krempien[9]

[1]*German Cancer Research Center DKFZ, Molecular Radiation Oncology, Heidelberg, Germany*
[2]*University Hospital of Munich LMU, Radiation Oncology, Munich, Germany*
[3]*National Cancer Institute, Radiation Oncology, Aviano, Italy*
[4]*University of Heidelberg, Surgery, Heidelberg, Germany*
[5]*University Hospital Gregorio Maranon, Surgery, Madrid, Spain*
[6]*University of Heidelberg, Radiation Oncology, Heidelberg, Germany*
[7]*University Hospital Gregorio Maranon, Radiation Oncology, Madrid, Spain*
[8]*University of Heidelberg, Orthopedics, Heidelberg, Germany*
[9]*Helios Clinic, Radiation Oncology, Berlin, Germany*

Purpose or Objective: In 2009 we reported promising first results of a European pooled analysis which evaluated the use of intraoperative radiation therapy (IORT) in the treatment of soft tissue sarcomas. However, comparison of these results with non-IORT series seemed difficult, mainly because of the inclusion of grossly incomplete resected lesions, patients treated without additional external beam radiation therapy (EBRT) and comparatively short follow-up. Therefore we re-analyzed our data limited to the patients who received IOERT preceeded or followed by EBRT after gross total resection with extended follow-up.

Material and Methods: Three European expert centers participated in the current analysis. Patients with gross incomplete resection, missing documentation of EBRT or primary lesions outside the extremities were excluded, leaving 259 patients for analysis. Median age was 55 years and median tumor size 8 cm. 80% of the patients presented in primary situation with 81% of the tumors located in the lower limb. Stage at presentation was I:9%, II:47%, III:39%, IV:5%. Most patients showed high grade lesions (FNCLCC grade 1:9%, 2:34%, 3:58%, predominantly liposarcoma (31%) and MFH (27%). IOERT was applied to the tumor bed with a median dose of 12 Gy using a median electron energy of 8 MeV. IOERT was preceeded (17%) or followed (83%) by EBRT with a median dose of 45 Gy in all patients. 37% of the patients received additional chemotherapy.

Results: Median follow up was 63 months. Surgery resulted in free margins (R0) in 71% while 29% suffered from microscopic positive margins (R1). We observed 27 local failures, transferring into a 5-year local control rate of 86%. Univariate analysis revealed primary vs recurrent situation and resection margin as significant factors for local control but only resection margin (5-year LC rate 94% vs 70%, HR 3.8) remained significant in multivariate analysis. Distant failure was found in 70 patients, resulting in a 5-year distant control rate of 69%. Factors with significant impact on distant control in univariate analysis were histology, grading, resection margin and stage IV prior/at IOERT, but only grading and stage IV remained significant in multivariate analysis. Actuarial 5-year rates of FFTF and OS were 61% and 78%, respectively. Significant factors for overall survival were only grading and stage IV prior/at IOERT (uni- and multivariate). Secondary amputations were needed in 14 patients (5%) resulting in a final limb-preservation rate of 95%. Good functional outcome was achieved in 81%.

Conclusion: Combination of IOERT and EBRT after limb sparing surgery resulted in encouraging local control and overall survival with excellent rates of preserved limb function in this unfavourable patient group. Our analysis identified resection margin as most important factor for local control while overall survival was mainly influenced by grading and stage IV prior/at IOERT.

OC-0541

Long-term results of the AIEOP MH-89 protocol for pediatric Hodgkin lymphoma

M. Robazza[1], M. Mascarin[1], C. Elia[1], A. Todesco[2], G. Scarzello[3], A. Pession[4], A. Garaventa[5], S. Barra[6], M. Zecca[7], N. Santoro[8], M. Bianchi[9], U. Riccardi[10], F. Locatelli[11], R. De Santis[12], P. Indolfi[13], M. Nardi[14], F. Porta[15], T. Casini[16], C.

Consarino[17], S. D'Amico[18], M. Provenzi[19], G.A. Zanazzo[20], P. Farruggia[21], G. Guerrini[22], R. Burnelli[22]
[1]*CRO - Aviano Cancer Center, Pediatric Radiotherapy Unit, Aviano, Italy*
[2]*Azienda Ospedaliera -Universita' di Padova, Clinica di Oncoematologia Pediatrica, Padova, Italy*
[3]*Azienda Ospedaliera -Universita' di Padova, U.O. di Radioterapia, Padova, Italy*
[4]*Clinica Pediatrica-Policlinico Sant'Orsola Malpighi, U.O. di Oncologia ed Ematologia "Lalla Seràgnoli", Bologna, Italy*
[5]*Ospedale Gaslini, U.O. di Ematooncologia Pediatrica, Genova, Italy*
[6]*Istituto Tumori Genova, U.O. di Radioterapia, Genova, Italy*
[7]*Policlinico San Matteo, U.O. di Oncoematologia pediatrica, Pavia, Italy*
[8]*Policlinico di Bari, U.O. di Oncoematologia Pediatrica, Bari, Italy*
[9]*Ospedale Regina Margherita, U.O. di Oncoematologia Pediatrica, Torino, Italy*
[10]*Ospedale le Molinette, U.O. di Radioterapia, Torino, Italy*
[11]*Ospedale Bambin Gesù, U.O. di Ematoncologia Pediatrica, Roma, Italy*
[12]*Casa Sollievo della Sofferenza, U.O. di Oncologia Pediatrica, San Giovanni Rotondo, Italy*
[13]*Università Federico II- policlinico di Napoli, U.O. di Ematooncologia Pediatrica, Napoli, Italy*
[14]*Azienda Ospedaliera - Universita' Pisana Ospedale S. Chiara, U.O. di Oncoematologia Pediatrica, Pisa, Italy*
[15]*Ospedale dei Bambini, U.O. di Oncoematologia Pediatrica, Brescia, Italy*
[16]*Azienda Ospedaliero-Universitaria Meyer, Dipartimento A.I. Oncoematologia SODC Tumori pediatrici e Trapianto di cellule staminali, Firenze, Italy*
[17]*Azienda Ospedaliero Pugliese-Ciaccio, U.O. di Oncologia Pediatrica, Catanzaro, Italy*
[18]*Clinica Pediatrica, U.O. di Oncologia Pediatrica, Catania, Italy*
[19]*Ospedali Riuniti, U.O. di Onco Ematologia Pediatrica, Bergamo, Italy*
[20]*Università degli studi di Trieste Ospedale Infantile Burlo Garofolo, U.O. Emato-Oncologia Pediatrica, Trieste, Italy*
[21]*A.R.N.A.S. Civico di Cristina e Benfratelli, U.O. Oncoematologia Pediatrica, Palermo, Italy*
[22]*Azienda Ospedaliero-Universitaria di Ferrara S.Anna, U.O. di Oncoematologia Pediatrica, Ferrara, Italy*

Purpose or Objective: The AIEOP-MH89 protocol aimed to optimize treatment results in pediatric Hodgkin lymphoma compared to the previous AIEOP-MH83 protocol. Modifications included: involved field instead of extended field radiation therapy (RT) in early-stage patients (pts); anticipated RT for pts with a mass/thorax ratio (M/T)>0.33; enrolment of advanced-stage pts in SIOP HD IV protocol.

Material and Methods: Between 1989-1995, 254 evaluable pts (median age 10 years, range 2-15 years) received the AIEOP-MH89 protocol. The pts were divided into 3 chemotherapeutic groups according to the clinical stage. Group (GR) 1, pts in stages IA and IIA, including those with a mass/thorax ratio (M/T)<0.33, received 3 cycles of adriamycin, bleomycin, vinblastine, and imidazole carboxamide (ABVD). RT was given after completion of chemotherapy. GR 2, pts in stages IEA, IB, IA, IIA with M/T>0.33, IIB, IIEB, IIIA, IIIS, and IIEA, was treated with alternating cycles of nitrogen mustard, vincristine, procarbazine, and prednisone (MOPP)/ABVD. The therapeutic program included 2 cycles of MOPP/ABVD before radiation therapy and 4 cycles MOPP/ABVD after RT. GR 3, pts in advanced stages IIIB, IVA and IVB, was treated according to the SIOP HD IV-87 protocol, with 2 cycles of vincristine, procarbazine, prednisone, adriamycin, (OPPA) and 2 cycles of cyclophosphamide vincristine, procarbazine, prednisone (COPP) followed by RT. Pts enrolled in GR 1 and 3 were treated with involved field RT. Pts with positive cervical lymph nodes received RT to the neck. In positive axillary lymph nodes, RT included also the sovraclavear region. Pts with mediastinal disease were treated with mediastinum and bilateral supraclavicular fossa RT, whereas pts with involvement of both mediastinum and other supra diaphragmatic lymph nodes stations received the conventional mantle RT. Pts with positive single inguinal lymph node received also comprensive RT to omolateral iliac nodal stations, whereas in case of multiple subdiaphragmatic lymph nodes disease, bilateral iliac nodal stations irradiation was avoided if not directly involved. The radiation doses were established according to response to initial chemotherapy, and were the same in GR 1 and 2: pts in CR and ≥75% PR received 20 Gy, whereas <75% PR received 40 Gy. GR 3 pts with CR o≥75% PR received 20 Gy, and 36 Gy those with 75% PR.

Results: In table 1 are reported the results in term of Overall Survival (OS) and Event Free Survival (EFS). Long term side effects of treatment were evaluated (median follow-up duration 16 years): 25.6% of the pts developed thyroid complications and 6.6% secondary malignancies.

Table 1: Overall and by Group Risk, Survival (OS) and Event Free Survival (EFS)

time	5 yrs	10 yrs	15 yrs	20 yrs	
OS	97.2%	96.0%	95.5%	94.8%	Risk Group
	99.0%	98.4%	97.9%	97.9%	GR1
	97.2%	96.2%	95.3%	94.5%	GR2
	93.7%	89.2%	89.2%	89.2%	GR3
EFS	89.3%	86.5%	86.5%	86.5%	
	94.9%	92.8%	92.8%	92.8%	GR1
	89.2%	86.8%	86.8%	86.8%	GR2
	75.0%	72.9%	72.9%	72.9%	GR3

Conclusion: The AIEOP-MH89 protocol improves globally OS and EFS. In GR 1 OS and EFS are the same compared to the previous protocol, minimizing radiation exposure. In GR 2 and 3 OS and EFS improved because of therapeutic changes. Analysis of delayed toxicities underlines the importance of long-term monitoring of pts.

OC-0542

Benign tumours among long-term childhood cancer survivors: a DCOG LATER record linkage study

J. Kok[1], J. Teepen[1], H. Van der Pal[2,3], W. Dolsma[3,4], E. Van Dulmen-den Broeder[3,5], M. Van den Heuvel-Eibrink[3,6,7], J. Loonen[3,8], W. Tissing[3,9], D. Bresters[3,10], B. Versluys[3,11], S. Neggers[3,12], M. Van der Heiden-van der Loo[3], F. Van Leeuwen[3,13], H. Caron[3,14], F. Oldenburger[15], G. Janssens[7,16,17], J. Maduro[4], R. Tersteeg[17], C. Van Rij[18], L. Daniels[19], C. Haasbeek[20], The DCOG LATER Study Group[3], A. Gijsbers-Bruggink[21], L. Kremer[1,3], C. Ronckers[1,3]
[1]*Academic Medical Center, Pediatric Oncology, Amsterdam, The Netherlands*
[2]*Academic Medical Center, Medical Oncology, Amsterdam, The Netherlands*
[3]*Stichting KinderOncologie Nederland SKION / Dutch Childhood Oncology Group DCOG, The Hague, The Netherlands*
[4]*University of Groningen/University Medical Center Groningen, Radiation Oncology, Groningen, The Netherlands*
[5]*VU University Medical Center, Pediatric Oncology/Hematology, Amsterdam, The Netherlands*
[6]*Sophia Children's Hospital/Erasmus Medical Center, Pediatric Oncology/Hematology, Rotterdam, The Netherlands*
[7]*Princess Maxima Center for Pediatric Oncology, Utrecht, The Netherlands*
[8]*Radboud University Medical Center, Pediatric Oncology and Hematology, Nijmegen, The Netherlands*
[9]*Beatrix Children's Hospital/University of Groningen/University Medical Center Groningen, Pediatric Oncology/Hematology, Groningen, The Netherlands*
[10]*Willem-Alexander Children's Hospital/Leiden University Medical Center, Pediatric Stem Cell Transplantation, Leiden, The Netherlands*
[11]*Wilhelmina Children's Hospital/University Medical Center Utrecht, Pediatric Oncology and Hematology, Utrecht, The Netherlands*
[12]*Erasmus Medical Center, Internal Medicine, Rotterdam, The Netherlands*